



Percentage Change

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What is it?



- Applied to any variable that's observed at various points in time
- Represents the relative change between the old value and new one

Formula:

■ **V2 = new, V1 = old**



$$\% \text{ Change} = \frac{V_2 - V_1}{V_1} \times 100$$

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**New minus old
divided by old X
100!!!**

Ex:

- Amy works in the supermarket for \$10/hr. If her pay increased to \$12/hr, what is her %



Solution:

$$\frac{12 - 10}{10} = \frac{2}{10} = 0.20 = 20\%$$



**New minus old
divided by old X 100!!!**

Growth rate

- Growth Rate =
$$\frac{(GDP^*) - GDP}{GDP} \times 100$$

- GDP* = Real GDP in year 2
GDP = Real GDP in year 1



Year	Real GDP (millions of Canadian \$)	Growth Rate
2006	1283033	
2007	1311260	$\frac{(1311260) - 1283033}{1283033} \times 100 = 2.2\%$

Inflation rate

- Inflation rate=

$$\frac{(X+1) - X}{X} \times 100$$

X=Index for year X

X+1=Index for year X+1



Category	Index for year X	Index for year X+1
Housing	120	130
Foodstuff	105	105
Travel	120	125
AVG Index	115	120

$$\frac{(120) - 115}{115} \times 100 = 4.35\%$$

Elasticity

Elastic Demand



Price elasticity of demand (PED)



- The responsiveness of demand with a change in the price
- $PED = (\% \text{ change in } QD) / (\% \text{ change in } P)$
- Why do we measure this?
 - This helps us show how the demand of a product will change with changes in price
 - Inelastic and elastic

Cross Elasticity of Demand (XED)



- The responsiveness of demand with a change in price of another product
- $$\text{XED} = \frac{(\% \text{ change in QD of product X})}{(\% \text{ change in P of product Y})}$$
- Why do we measure this?
 - Shows how the different products will react to another
 - Shows if products are substitutes or complements

Income Elasticity of Demand (YED)



- The responsiveness of demand with a change in income
- $YED = (\% \text{ change in } QD) / (\% \text{ change in income of consumer})$
- Why do we measure this?
 - Shows how the demand for a product will react when people have a change in income
 - If products are necessities, superior goods, normal goods, or inferior goods

Example #1:

- Lydia is convinced that by decreasing the price of her noodles by half, her total revenue (TR) will double. Explain to her why this would be the case only if PED for her noodles was -6.0 .



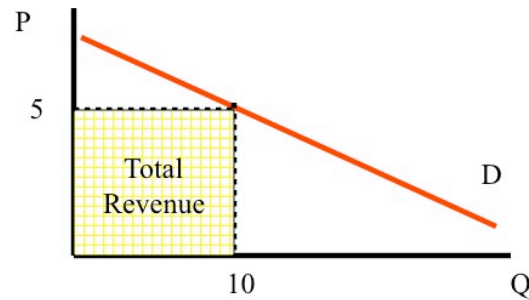
Answer #1:

■ Formulas:

$$PED = \frac{\Delta \% \text{ in quantity demanded of the product}}{\Delta \% \text{ in the change in price of the product}}$$



$$\text{Price} \times \text{Quantity} = \text{Total Revenue}$$
$$5 \times 10 = 50$$



Answer #1:

- $\frac{1}{2}$ (original price)
- Percentage change in price = -50%
- Revenue to double if price is $\frac{1}{2}$
= quantity must increase 4X



Answer #1:

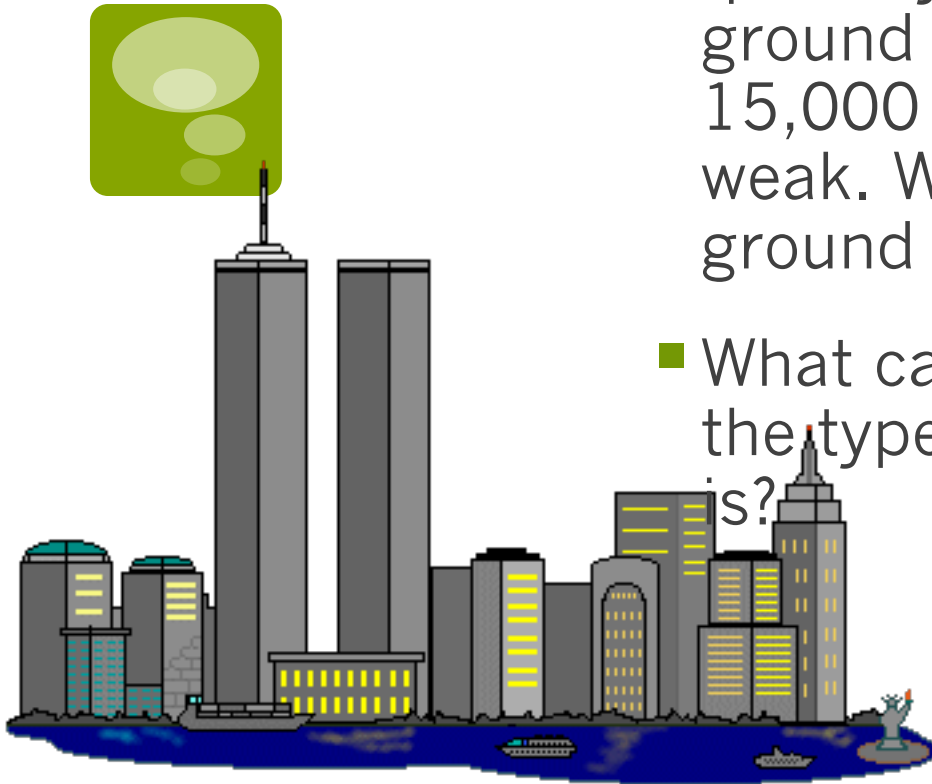
$$TR_2 = \frac{1}{2} P_1 \bullet 4Q_1 = \frac{4}{2} \bullet P_1 Q_1 = 2 \bullet TR_1$$

- Quantity quadruples, increase by 300%
- Substitute into original PED function:
- $+300\% / -50\% = -6$



Example #2

- Per capita income in Corinth increase from \$25,000/year to \$33,750/year. As a result, quantity demanded for fatty ground meat decrease from 15,000 kg/week to 14,250 kg/week. What is the YED of fatty ground meat?
- What can you conclude about the type of fatty ground meat is?



Example #2

$$YED = \left(\frac{\Delta Q}{\Delta Y}\right) \cdot \left(\frac{Y_1}{Q_1}\right) = \left(\frac{\frac{14,250 - 15,000}{15,000}}{\frac{33,750 - 25,000}{25,000}}\right)$$

■ $= -0.14$

- YED is negative = fatty ground meat is an inferior product (as people's income rise, they buy less of it)



Example #3

- When Carrefour increased the price of whole milk from \$0.80 to \$1.00, the weekly of low-fat milk increased from 25,000 to 30,000 gallons. Calculate the XED for low-fat milk with respect to the price of whole milk



Example #3

- Substitute = answer must be +
- Percentage change in QD of low fat milk:

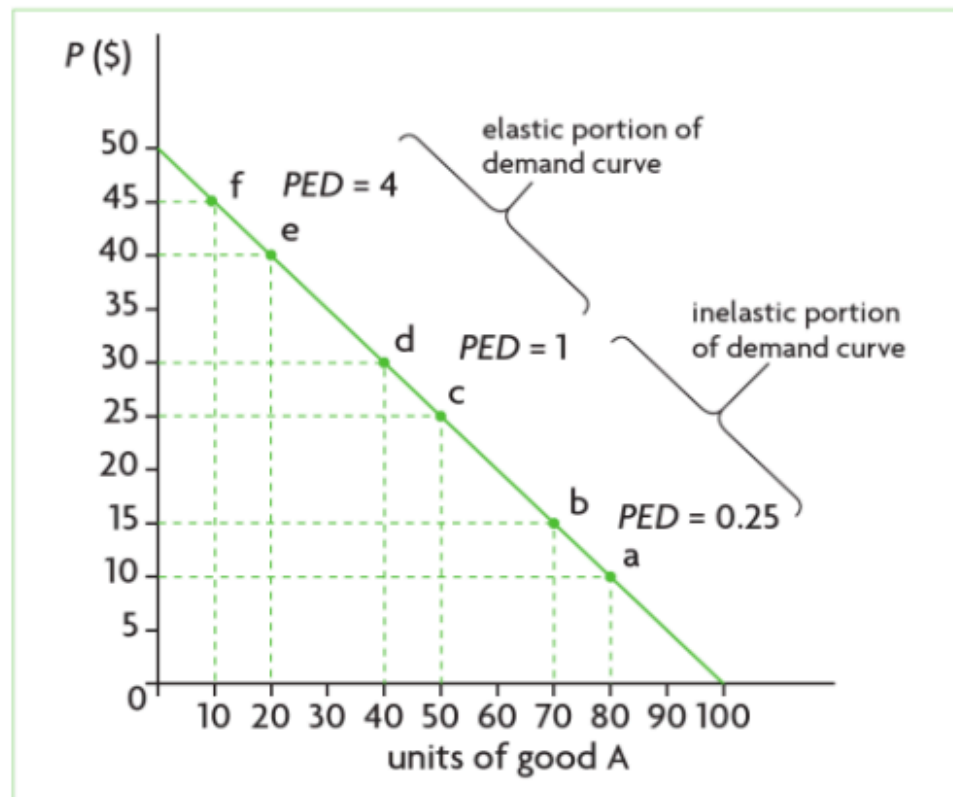
$$\% \Delta Q = \frac{\Delta Q}{Q_1} = \frac{(Q_2 - Q_1)}{Q_1} = +20\%$$

- Percentage change in P of whole milk:

$$\% \Delta P = \frac{\Delta P}{P_1} = \frac{(P_2 - P_1)}{P_1} = +25\%$$



Why does PED varies across a line?



Answer:

$$\frac{Q_2 - Q_1}{\frac{P_2 - P_1}{P_1}} = \left(\frac{Q_2 - Q_1}{P_2 - P_1}\right) \left(\frac{P_1}{Q_1}\right)$$



- Slope of a straight line is constant (first part of equation)
- Ratio of P_1/Q_1 varies



Thank you!